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# Cost to government health-care services of treating acute self-poisonings in a rural district in Sri Lanka

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**Objective** To estimate the direct financial costs to the Sri Lanka Ministry of Health of treating patients after self-poisoning, particularly from pesticides, in a single district.

**Methods** Data on staff, drug, laboratory and other inputs for each patient admitted for self-poisoning were prospectively collected over a one-month period from one general hospital (2005) and five peripheral hospitals (2006) in the Anuradhapura district. Data on transfers to secondary- and tertiary-level facilities were obtained for a 6-month period from 30 peripheral hospitals. The cost of the inputs in United States dollars (US\$), using 2005 figures, was derived from hospital accounts.

**Findings** The average total cost of treating a self-poisoned patient at the general hospital was US\$ 31.83, with ward staff input and drugs being the highest expenditure category and only US\$ 0.19 of this sum related to capital and maintenance costs. The average total cost of treatment was highest for self-poisoning with pesticides (US\$ 49.12). The patients placed in the intensive care unit, who comprised 5% of the total, took up 75% of the overall treatment cost for all self-poisoned patients at the general hospital. The average total cost of treating self-poisoned patients at peripheral hospitals was US\$ 3.33. The average patient cost per transfer was US\$ 14.03. In 2006, the total cost of treating self-poisoned patients in the Anuradhapura district amounted to US\$ 76 599, of which US\$ 53 834 were comprised of pesticide self-poisonings. Based on the total treatment cost per self-poisoned patient estimated in this study, the cost of treating self-poisoned patients in all of Sri Lanka in 2004 was estimated at US\$ 866 304.

**Conclusion** The cost of treating pesticide self-poisonings may be reduced by promoting the use of less toxic pesticides and possibly by improving case management in primary care hospitals. Additional research is needed to assess if increasing infrastructure and staff at peripheral hospitals could reduce the overall cost to the government, optimize case management and reduce pressure on secondary services.

Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

## Introduction

A conservative estimate is that at least 258 000 deaths occur from pesticide self-poisoning worldwide each year,<sup>1</sup> most of them in Asia, and this figure is greatly exceeded by the number of self-poisoned patients who seek treatment at health facilities. According to an analysis of hospital admissions in southern Sri Lanka, from 1990 to 2002 the average annual poisoning incidence rate in this southern region was 318 per 100 000, with 64% of this figure represented by self-poisonings.<sup>2</sup> In the North Central province of Sri Lanka, the annual incidence rates in 2002 of attempted self-poisoning and fatal self-poisoning was 363 and 27 per 100 000, respectively.<sup>3</sup> According to a community study, the high number of pesticide self-poisonings was an impulsive response to economically or psychosocially stressful events facilitated by easy access to pesticides.<sup>4</sup>

The cost to government health-care services of treating poisoned patients is probably substantial. In a Sri Lankan study of the cost of treating patients who had poisoned themselves with yellow oleander seeds (*Thevetia peruviana*), treatment with and without antitoxin cost US\$ 691.6 and US\$ 58.6 per patient, respectively.<sup>5</sup> However, the overall costs

of treating self-poisoned patients are not well documented in low-income countries, where the overwhelming majority of poisonings take place. This is unfortunate, as studies on health costs can inform health policy and guide investment and management at different levels of the health-care system to optimize the use of resources.

The objective of this study was to estimate the direct financial costs to the Sri Lankan Ministry of Health of treating self-poisoned patients in a single district, with a particular focus on self-poisoning with pesticides.

## Methods

### Study area

The study was carried out in the Anuradhapura district, where most of the 780 000 inhabitants depend on agriculture for their livelihood. The district is served by 1 general and 33 peripheral government hospitals, where practically all cases of acute poisoning are treated. The Anuradhapura General Hospital, with 1300 beds and limited intensive care facilities, is the largest hospital in the district. The 33 peripheral hospitals, which provide in-ward services, transfer all patients needing secondary care to the Anuradhapura General Hospital.

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## Selection of hospitals

The Anuradhapura General Hospital was selected as the source of detailed information on patient treatment inputs because it is the only secondary-level treatment facility in the district. The peripheral hospitals were listed according to size and distance from the Anuradhapura General Hospital. Three of them had to be excluded from the sampling owing to poor security in the areas where they were located. Of the 18 hospitals located within 40 km of Anuradhapura, 3 were selected at random for inclusion in the study; 2 of the 12 hospitals located beyond 40 km from the general hospital were also included by random selection. The decision to include only 1 of every 6 peripheral hospitals was based on the assumption that representative information on a per patient basis could be obtained at this level.

## Patient sampling

Patient treatment input costs were calculated for all intentionally self-poisoned patients admitted to the Anuradhapura General Hospital from 26 June to 26 July 2005. Costs for the 5 selected peripheral hospitals were based on all intentional self-poisoning patients admitted in July 2006. The one-year difference in the period of data collection reflected the availability of research staff.

Ongoing studies within the Anuradhapura district made it possible to obtain patient-specific transfer data on self-poisoned patients who had been transferred from all 30 peripheral hospitals in the district to a higher-level hospital facility from 1 July to 31 December 2005. Transfer costs also included the few cases transferred to the tertiary hospital outside the district.

## Patient-specific inputs and costs

Using a preformatted datasheet, one study doctor, nurse or registered medical officer in the hospitals prospectively and systematically collected information on all inputs provided for each admitted patient. Research assistants cross-checked the recorded patient details against the individual in-patient records maintained by the hospitals.

Data on the price of drugs, the cost of treatments and laboratory tests, staff salaries and allowances, utilities, patients' meals, ambulance fuel and maintenance costs, the cost of cleaning wards and

annual hospital administrative costs for 2005 were collected from the Medical Supply Division of the Ministry of Health. Provincial health budget data were obtained from the Finance Commission of the Ministry of Finance. All prices excluded government value-added tax and were collected in United States dollars (US\$). At the time, US\$ 1 equalled 100 Sri Lankan rupees.

## Secondary hospital treatment costs

Treatment costs included four categories: ward care staff costs, laboratory investigation costs, drug costs and non-drug treatment costs. The total treatment cost was disaggregated based on the type of poison.

Total capital and maintenance costs for the Anuradhapura General Hospital were calculated by summing all annual cost items provided by hospital administrators. Per patient capital and maintenance costs were calculated by dividing total annual capital and maintenance costs by the total number of admissions (including for self-poisoning) over the year. Depreciation of hospital buildings, ambulance and other capital items were not included in the estimations.

The total per patient cost to the government of treating self-poisoned patients at the general hospital was calculated by summing per patient treatment and per patient capital and maintenance costs.

## Peripheral hospital treatment costs

The per capita cost of treating self-poisoned patients in the 5 peripheral hospitals was calculated the same way as for the general hospital. However, due to the lack of reliable records on capital and maintenance costs, these were excluded from the analysis. Because peripheral hospitals lack many facilities such as intensive care units (ICUs), the capital and maintenance costs per patient were assumed to be smaller than the cost of other items.

## Transfer costs

Transfer costs were calculated based on patient transfer data collected from 30 peripheral hospitals and included the cost of the ambulance fuel. Ambulance capital and maintenance costs were already included in the capital cost estimations of the general hospital.

## Total costs

The number of self-poisoned patients admitted to all the hospitals during 2005 was available from information generated by a prospective study.<sup>3</sup> The cost to the Anuradhapura district was compared with the health budget allocation for the Sri Lankan North Central province (Anuradhapura being one of its two districts), with a population of 1.2 million. Since the most recent information on the total number of poisonings in Sri Lanka was from 2004, this year was used for national cost estimates.

## Results

### Treatment at the general hospital

Over the 31-day study period in 2005, 179 self-poisoned patients were admitted to the Anuradhapura General Hospital. Of these patients, 165 were discharged after treatment, 8 were transferred to other hospitals outside the district for further treatment and 6 died. The average length of admission in the hospital was 73 hours and 4 minutes.

Of the 179 self-poisoned patients, 107 had suffered self-poisoning with pesticides, 56 with yellow oleander seeds (*Thevetia peruviana*) and 16 with medicine.

The average total cost of treating a self-poisoned patient was US\$ 31.83, and of this amount, only US\$ 0.19 corresponded to capital and maintenance costs. The average total cost of treatment was highest for self-poisoning with pesticides (US\$ 49.12), followed by medicine overdose (US\$ 9.27) and ingestion of yellow oleander seeds (US\$ 5.25). The average total cost of treating pesticide self-poisoning was greatest for the 37 patients who had ingested organophosphate pesticides (US\$ 87.44), followed by the 11 who had ingested carbamate (US\$ 51.80). It was lowest for the 26 who had ingested a herbicide (US\$ 10.49) (Table 1).

The cost of ward staff input was the highest expenditure category, with a mean of US\$ 13.08 per self-poisoned patient (range: US\$ 0.11–563.75), followed by the cost of drugs with a mean of US\$ 11.96 per patient (range: US\$ 0.00–1032.77), non-drug treatment with a mean of US\$ 4.90 (range: US\$ 0.00–132.39) and investigation with a mean of US\$ 1.75 (range:

US\$ 0.00–68.4). Nursing and medical staff respectively took up 65% and 29% of the total cost of ward staff input.

Although only 10 of the 179 patients received intensive care, this small group made up 75% of the total cost of treating all self-poisoned patients at the general hospital. The very high cost involved in treating ICU patients was mainly attributable to the costs of drugs and nursing input. The 10 cases treated in the ICU during the month of observation were more than the monthly average of 6.5 and 8.0 ICU cases seen throughout the rest of 2005 and 2006, respectively.

The highest treatment cost for any single patient during the study period (US\$ 308.86) was seen in a case of chlorpyrifos self-poisoning. This included care in the ICU. The average total treatment cost for the eight other chlorpyrifos poisoning cases that were not transferred to the ICU was US\$ 10.7.

### Treatment at peripheral hospitals

During July 2006, 40 intentionally self-poisoned patients were admitted to the 5 selected peripheral hospitals. Of the 40, 9 were discharged after treatment and 31 were transferred to another hospital. There were no deaths that month. The average duration of admission in the hospital was 8 hours and 26 minutes. Of the 40 self-poisoned patients admitted to the 5 peripheral hospitals, 29 had ingested pesticides, 8 had ingested yellow oleander seeds (*Thevetia peruviana*) and 3 had taken a medicine overdose.

The average total cost of treating a self-poisoned patient was US\$ 3.33 at

Table 1. Estimated costs of treating 179 self-poisoned patients admitted to the Anuradhapura General Hospital in Sri Lanka from 26 June to 26 July 2005

Type of poison	Patients (No.)	Average cost per patient (US\$)	Total cost (US\$)
<b>Pesticide</b>	107	49.12	5255.84
Organophosphate	37	87.44	3235.28
Carbamate	11	51.80	569.80
Herbicide	26	10.49	272.74
Unknown and other	33	35.47	1170.51
<b>Yellow oleander seeds (<i>Thevetia peruviana</i>)</b>	56	5.25	294.00
<b>Medicine</b>	16	9.27	148.32
<b>Other</b>	0	31.83	0
<b>Unknown</b>	0	31.83	0
<b>All</b>	—	—	5698.16

US\$, United States dollars.

peripheral hospitals. The average total cost of treatment was highest for self-poisoning with pesticides (US\$ 3.70) – US\$ 3.96 for organophosphate, US\$ 3.77 for carbamate and US\$ 3.50 for herbicides – followed by ingestion of oleander seeds (US\$ 2.34) and medicines (US\$ 2.45) (Table 2).

The cost of ward staff input was the highest expenditure category with a mean of US\$ 1.65 per self-poisoned patient (range: US\$ 0.34–4.08), followed by drugs (mean: US\$ 0.67; range US\$ 0.00–3.98), laboratory investigations (mean: US\$ 0.59; range: US\$ 0.00–2.68) and non-drug treatments (mean: US\$ 0.02; range: US\$ 0.00–0.80). Overall, nurses, medical doctors and ward attendants made up 53% of the total cost of treating a case of self-poisoning, with an approximately equal share from each staff category.

### Transfers

From July to December 2006, 816 self-poisoned patients were admitted to the district's 30 peripheral hospitals, with a transfer rate of 57%. The Anuradhapura General Hospital received 95% of these transfers. The average cost per transfer, which comprised primarily the cost of fuel, was US\$ 14.03. Assuming the same patient load<sup>3</sup> and the same transfer rate for the previous 6 months of 2006, total admissions of self-poisoned patients for all of 2006 were estimated to be 1632. Among them there were 930 transfers, 473 of them patients self-poisoned with pesticides.

### Self-poisoned patients in the district, 2006

During 2006, 1908 patients were admitted to the Anuradhapura General Hospital following self-poisoning. Using average total costs by type of poison calculated from the detailed observational studies of 179 persons in 2005, we estimated the total treatment cost for the year to be US\$ 58 114.06 (Table 3).

In 2006, an estimated 1632 self-poisoned patients were admitted to all peripheral hospitals in the Anuradhapura district. As seen from Table 4, the total cost of treating all self-poisoned patients in peripheral hospitals in the district was estimated at US\$ 5438.46.

The estimated transfer cost for all 930 self-poisoned patients in the Anuradhapura district for 2006 amounted to US\$ 13 047.

The total cost of treating self-poisoned patients in the Anuradhapura district amounted to US\$ 76 599. Of

Table 2. Estimated costs of treating 40 self-poisoned patients admitted to 5 peripheral hospitals in the Anuradhapura district in Sri Lanka from 1 to 31 July 2006

Type of poison	Patients (No.)	Average cost per patient (US\$)	Total cost (US\$)
<b>Pesticide</b>	29	3.70	107.30
Organophosphate	17	3.96	67.32
Carbamate	2	3.77	7.54
Herbicide	4	3.50	14.00
Unknown and other	6	3.06	18.36
<b>Yellow oleander seeds (<i>Thevetia peruviana</i>)</b>	8	2.34	18.72
<b>Medicine</b>	3	2.45	7.35
<b>Other</b>	0	3.33	0
<b>Unknown</b>	0	3.33	0
<b>All</b>	—	—	133.37

US\$, United States dollars.



this amount, US\$ 53 834 were attributable to self-poisoning with pesticides.

### Estimate for all poisoned patients in Sri Lanka

In 2004, the Medical Statistics Unit of the Ministry of Health recorded a total of 48 098 poisoned patients admitted to health-care services throughout Sri Lanka. Based on our estimates of the total per patient treatment cost for the different types of poisonous substances and for different levels of health-care services, and assuming a transfer rate of 57%, the annual cost of treating poisoned patients in Sri Lanka for 2004 was estimated at US\$ 866 304. This included a cost of US\$ 527 452 for secondary and tertiary treatment services, US\$ 87 727 for peripheral services and US\$ 251 125 for cost of transfers. These figures apply to all poisoned patients, not only self-poisoned ones, as the cause of poisoning could not be obtained from the existing national data.

## Discussion

We estimated the total cost of treating self-poisoned patients in the Anuradhapura district during 2006 to be US\$ 76 599. This represents 2.8% of the total government health expenditure for all health services of US\$ 2 704 020, including all preventive, curative and administrative activities in the North Central province.

This study clearly shows that the average cost of treating cases of self-poisoning with pesticides is much higher than that of treating patients self-poisoned with other substances.

Table 3. Estimated costs of treating 1908 self-poisoned patients in the Anuradhapura General Hospital in Sri Lanka in 2006

Type of poison	Patients (No.)	Average cost per patient (US\$)	Total cost (US\$)
<b>Pesticide</b>	886	49.12	43 520.32
Organophosphate	351	87.44	30 691.44
Carbamate	105	51.80	5 439.00
Herbicide	54	10.49	566.46
Unknown and other	376	35.47	13 336.72
<b>Yellow oleander seeds (<i>Thevetia peruviana</i>)</b>	410	5.25	2 152.50
<b>Medicine</b>	312	9.27	2 892.24
<b>Other</b>	8	31.83	254.64
<b>Unknown</b>	292	31.83	9 294.36
<b>All</b>	—	—	58 114.06

US\$, United States dollars.

This is partly due to the very high cost of care in ICUs and to the higher numbers of general ward staff needed for the care of patients self-poisoned with pesticides. We found the average cost of treating poisoned patients to be higher for organophosphates than for other pesticides. A shift to the use of pesticides whose ingestion is linked to a low likelihood of ICU admission would produce substantial savings. However, the pesticide-specific costs in this study are based on a small number of cases, which makes it difficult to generalize.

Interestingly, the total cost of transferring patients to the general hospital was found to be more than twice the total cost of treating patients self-poisoned with pesticides in the peripheral hospitals. Transfer costs are extremely sensitive to fuel costs, which doubled between the beginning of the study and May 2008. Moreover, the cost of

treatment at peripheral hospitals was significantly lower than at secondary hospitals, although a direct comparison is prone to bias since the severity of complications among the patients admitted to the two levels of health care following poisoning may be different. The many transfers to referral hospitals is likely to reflect the lack of essential antidotes and appropriate resuscitative equipment for treating pesticide self-poisonings in smaller peripheral health facilities.<sup>6</sup> Increased investment at the peripheral level may reduce the number of transfers and speed up the onset of appropriate treatment.

We estimated US\$ 866 304 to be the total government treatment cost of treating all poisonings in Sri Lanka for the year 2004. As self-poisoning is a major problem across rural south-east Asia, the cost to government health services in the region will be substantial. This study suggests that significant financial benefits could be attained by investing in measures and policies outside the health sector aimed at preventing self-poisonings.

We are fully aware that the financial costs to government health-care services do not reflect either the overall cost to society or the psychological impact on households of self-poisoning or poisoning in general.<sup>7</sup>

### Limitations

The estimates presented in this study are based on several assumptions. The annual cost calculations in particular should be interpreted with caution, since even small fluctuations in the number of patients placed in the ICU have a substantial influence on the

Table 4. Estimated costs of treating 1632 self-poisoned patients in all peripheral hospitals in the Anuradhapura district in Sri Lanka in 2006

Type of poison	Patients (No.)	Average cost per patient (US\$)	Total cost (US\$)
<b>Pesticide</b>	994	3.70	3677.80
Organophosphate	274	3.96	1085.04
Carbamate	82	3.77	309.14
Herbicide	36	3.50	126.00
Unknown and other	602	3.06	1842.12
<b>Yellow oleander seeds (<i>Thevetia peruviana</i>)</b>	204	2.34	477.36
<b>Medicine</b>	184	2.45	450.80
<b>Other</b>	250	3.33	832.50
<b>Unknown</b>	0	3.33	0
<b>All</b>	—	—	5438.46

US\$, United States dollars.

average cost of treating pesticide self-poisoning cases. Also, the lack of detailed estimates of maintenance costs across hospital departments and peripheral hospitals weakened the study. Similarly, the large proportion of cases for which the type of poison purposely ingested was unknown makes the estimates less reliable. The overall cost to national health-care services of treating pesticide self-poisoning cases will be greatly influenced by treatment capacity across the island, especially by the availability of ventilators and ICU services, the local pattern of transfers to higher level facilities, and the quality of the health information system (which is likely to underestimate the number of poisoning

cases). Furthermore, although national guidelines on the management of poisoning have been in place for almost 10 years, treatment approaches are likely to vary across the country. In addition, the national estimate is influenced by the fact that the estimated cost per patient for secondary services had to be used to estimate the cost for tertiary services as well, since the per patient cost for the latter was unavailable.

## Conclusion

Further investment in decentralized treatment capacity at peripheral hospitals is likely to reduce the overall cost to the government and optimize treatment. ■

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**Competing interests:** None declared.

## Résumé

### Coût pour les services de santé publics du traitement des auto-empoisonnements aigus dans un district rural du Sri Lanka

**Objectif** Estimer le coût financier direct pour le Ministère de la santé sri lankais du traitement des cas d'auto-empoisonnement, notamment par des pesticides, dans un district particulier.

**Méthodes** Des données concernant le personnel soignant, les médicaments administrés et les tests de laboratoire réalisés, ainsi que d'autres informations sur chacun des patients admis pour auto-empoisonnements ont été collectées préalablement sur une période de un mois auprès d'un hôpital général (2005) et de cinq hôpitaux périphériques (2006) du district d'Anuradhapura. Des données concernant les transferts de patients dans des établissements de niveau secondaire ou tertiaire ont été obtenues sur une période de 6 mois auprès de 30 hôpitaux périphériques. Le coût des intrants précédemment mentionnés en dollars des Etats-Unis d'Amérique (US \$) a été déterminé à partir des comptabilités hospitalières, en utilisant les chiffres de 2005.

**Résultats** Le coût total moyen pour traiter un cas d'auto-empoisonnement dans un hôpital général s'élevait à US \$ 31,83, montant dans lequel le personnel soignant et les médicaments représentaient les catégories de débours les plus importantes et les coûts du capital et de maintenance n'atteignaient que US \$ 0,19. C'est pour les auto-empoisonnements par des pesticides que le coût moyen du traitement était le plus élevé (US \$ 49,12). Les patients placés dans des unités de soins intensifs, qui

représentaient 5 % de l'ensemble des patients, totalisaient à eux-seuls 75 % du coût global de traitement de l'ensemble des victimes d'auto-empoisonnement dans l'hôpital général. Le coût total moyen du traitement d'un cas d'auto-empoisonnement dans un hôpital périphérique était de US \$ 3,33. Le coût moyen de transfert d'un patient se montait à US \$ 14,03. En 2006, le coût total du traitement des victimes d'auto-empoisonnement dans le district d'Anuradhapura atteignait US \$ 76 599, dont US \$ 53 834 pour les auto-empoisonnements par des pesticides. A partir de l'estimation du coût total du traitement par victime d'auto-empoisonnement établie dans cette étude, on a évalué à US \$ 866 304 le coût du traitement des cas d'auto-empoisonnement pour l'ensemble du Sri Lanka sur l'année 2004.

**Conclusion** Il serait possible de réduire le coût du traitement des auto-empoisonnements par des pesticides en faisant la promotion de pesticides moins toxiques et éventuellement en améliorant la prise en charge des cas dans les établissements de soins primaires. D'autres travaux de recherche sont nécessaires pour évaluer si un renforcement des infrastructures et du personnel des hôpitaux périphériques pourrait permettre une diminution du coût global pour l'Etat, une optimisation de la prise en charge des cas et une moindre pression sur les services secondaires.

## Resumen

### Costo del tratamiento de las intoxicaciones voluntarias agudas en los servicios de salud públicos en un distrito rural de Sri Lanka

**Objetivo** Estimar los costos financieros directos que supone para el Ministerio de Salud de Sri Lanka el tratamiento de los pacientes con intoxicación voluntaria, en particular por plaguicidas, en un determinado distrito.

**Métodos** En un hospital general (2005) y cinco hospitales periféricos (2006) del distrito de Anuradhapura, a lo largo de un mes se reunieron datos prospectivos sobre el personal, los medicamentos, la información de laboratorio y otras variables

sobre todos los pacientes ingresados por intoxicación voluntaria. Durante un periodo de seis meses se obtuvieron datos de 30 hospitales periféricos sobre los traslados de esos pacientes a centros de nivel secundario y terciario. El costo de los insumos en dólares de los Estados Unidos (US\$), con cifras de 2005, se calculó a partir de las cuentas hospitalarias.

**Resultados** En el hospital general, el costo medio total del tratamiento de los pacientes que se habían intoxicado

voluntariamente fue de US\$ 31,83, suma dentro de la cual el gasto más importante correspondió al personal de sala y los medicamentos, y sólo US\$ 0,19 a los gastos de capital y mantenimiento. El costo total medio del tratamiento fue máximo en el caso de las intoxicaciones voluntarias por plaguicidas (US\$ 49,12). Los pacientes ingresados en la unidad de cuidados intensivos, el 5% del total, representaron el 75% del costo global del tratamiento de todos los pacientes con intoxicación voluntaria atendidos en el hospital general. El costo total medio del tratamiento de los pacientes intoxicados voluntariamente en los hospitales periféricos fue de US\$ 3,33. El costo medio por traslado fue de US\$ 14,03. En 2006, el costo total del tratamiento de esos pacientes en el distrito de Anuradhapura ascendió a US\$ 76 599, de los cuales US\$ 53 834 correspondían

a intoxicaciones voluntarias con plaguicidas. Considerando el costo total estimado en este estudio para el tratamiento por paciente intoxicado, se calcula que el costo del tratamiento de los pacientes con intoxicación voluntaria en todo Sri Lanka en 2004 ascendió a US\$ 866 304.

**Conclusión** El costo del tratamiento de las intoxicaciones voluntarias por plaguicidas podría reducirse promoviendo el uso de plaguicidas menos tóxicos y, posiblemente, mejorando el tratamiento de los casos en los hospitales de atención primaria. Se requerirán nuevas investigaciones para determinar si la ampliación de la infraestructura y el personal en los hospitales periféricos permitiría reducir el costo global para la Administración, optimizar el manejo de los casos y reducir la presión en los servicios secundarios.

## ملخص

### تكاليف خدمات الرعاية الصحية التي تقدمها الحكومة لمعالجة تسميم الذات في إحدى المناطق الريفية من سريلانكا

الرعاية المركزة والذين يشكلون 5% من مجمل المرضى، 75% من مجمل تكاليف المعالجة لجميع المرضى الذين سممو أنفسهم في المستشفيات العمومية. أما القيمة الوسطية الإجمالية لمعالجة المرضى الذين سممو أنفسهم في مستشفى محيطي فكانت 33.3 دولار. وكانت القيمة الوسطية لتكاليف تحويل المريض 03.14. وفي عام 2006 بلغت التكاليف الإجمالية لمعالجة المرضى الذين سممو أنفسهم في مقاطعة أنورادهابورا 76 599 دولاراً أمريكياً، ذهب 53 834 دولاراً أمريكياً منها إلى حالات تسميم الذات بمبيدات الهوام. وبناءً على التكاليف الإجمالية لمعالجة المريض الذي سمم نفسه في هذه الدراسة فإن تكاليف معالجة المرضى الذين سممو أنفسهم في سيري لانكا عام 2004 تقدر بـ 866 304 دولاراً أمريكياً.

**الاستنتاج:** يمكن إنقاص تكاليف معالجة المرضى الذين سممو أنفسهم بتشجيع استخدام مبيدات هوام أقل سمية، وربما بتحسين تدبير الحالات في مستشفيات الرعاية الأولى. وتتم الحاجة إلى المزيد من البحوث لتقييم ما إذا كانت زيادة البنية التحتية والعاملين في المستشفيات المحيطة قد تقلل من التكاليف الإجمالية التي تتحملها الحكومة، وتؤدي إلى تحسين تدبير الحالات وإنقاص الضغط على الخدمات الثانوية.

**الهدف:** تقدير التكاليف الاقتصادية المباشرة في وزارة الصحة في سريلانكا لمعالجة المرضى بعد تسميم أنفسهم، ولاسيما بمبيدات الهوام في إحدى المقاطعات. **الطريقة:** جُمعت المعطيات حول العاملين والأدوية والمختبرات وغيرها من المدخلات الخاصة بكل مريض أدخل إلى المستشفى العمومي (2005) وخمس مستشفيات محيطية عام 2006 بسبب تسميم نفسه خلال فترة شهر في مقاطعة أنورادهابورا. وتم الحصول على المعطيات حول نقل المرضى إلى المستويات الثانوية والثالثية من المرافق الصحية لمدة 6 شهور من خلال 30 مستشفى محيطياً. كما تم الحصول على تكاليف المدخلات مقدرة بالدولارات الأمريكية استناداً إلى الأرقام الخاصة بعام 2005 التي جمعت من حسابات المستشفيات.

**الموجودات:** بلغت القيمة الوسطية لتكاليف معالجة مريض قام بتسميم نفسه في مستشفى عمومي 31.83 دولاراً أمريكياً، واتضح أن البند الذي يشكل أعلى النفقات هو العاملون في أجنحة المستشفى والأدوية، فيما لم يتجاوز مجموع النفقات على الصيانة والأصول 19.0 دولار أمريكي. وكانت أعلى القيم الوسطية لتكاليف معالجة المرضى الذين سممو أنفسهم بمبيدات الهوام (12.49 دولار أمريكي)، وقد استأثر المرضى الذين أدخلوا في وحدات

## References

- Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: systematic review. *BMC Public Health* 2007;7:357. PMID:18154668 doi:10.1186/1471-2458-7-357
- van der Hoek W, Konradsen F. Analysis of 8000 hospital admissions for acute poisoning in a rural area of Sri Lanka. *Clin Toxicol (Phila)* 2006;44:225-31. PMID:16749538
- Eddleston M, Sudarshan K, Senthikumar M, Reginald K, Karalliedde L, Senarathna L, et al. Patterns of hospital transfer for self-poisoned patients in rural Sri Lanka: implications for estimating the incidence of self-poisoning in the developing world. *Bull World Health Organ* 2006;84:276-82. PMID:16628300 doi:10.2471/BLT.05.025379
- Konradsen F, Hoek W, Peiris P. Reaching for the bottle of pesticide — a cry for help. Self-inflicted poisonings in Sri Lanka. *Soc Sci Med* 2006;62:1710-9. PMID:16165259 doi:10.1016/j.socscimed.2005.08.020
- Eddleston M, Senarathna L, Mohamed F, Buckley N, Juszczak E, Sheriff MH, et al. Deaths due to absence of an affordable antitoxin for plant poisoning. *Lancet* 2003;362:1041-4. PMID:14522536 doi:10.1016/S0140-6736(03)14415-7
- Senarathna L, de Silva D, Buckley NA, Eddleston M, Dawson AH. Effect of resource availability and medical staff workload on outcome for poisoning in rural Sri Lanka. *Proceedings of the 6th annual congress of the Asian Pacific Association of Medical Toxicology, Bangkok, 12-14 December 2007*.
- Cole DC, Carpio F, León N. Economic burden of illness from pesticide poisonings in highland Ecuador. *Rev Panam Salud Publica* 2000;8:196-201. PMID:11036430 doi:10.1590/S1020-49892000000800007